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REMARKS/ARGUMENTS

Applicant has canceled claim 11 and deleted the corresponding paragraph (a) from claim 1. By way of explanation, and as an initial matter, applicant notes that the Examiner rejected claim 11, but allowed claim 1. Since claim 11 is directed to paragraph (a) of claim 1, it therefore occurs to applicant that the Examiner may not have understood that claim 1 calls for a method that incorporates "at least one" of the steps that are thereafter listed. Applicant calls this to the Examiner's attention in the event he had the mistaken belief that claim 1 calls for each of the listed steps, which it does not. Accordingly, notwithstanding the allowance of claim 1, since applicant has canceled claim 11, he is also deleting paragraph (a) from claim 1.

Also as an initial matter, the Examiner stated that claim 16 appears to be missing in the amendment filed January 27, 2006. Actually, it is not missing, but due to an artifact of the placement of the last equation of claim 15, it is somewhat misaligned, but in fact is entirely in the amendment (see the text just below the equation on page 6 of the amendment).

In addition, the Examiner indicated that claims 15, 19 and 21 would be allowed if made independent. Applicant has amended claims 15 and 19 to make them independent. Claim 21 depends from claim 19, so does not need to be made independent. Additionally, because the basis for allowing claim 15 also appears in claim 16, applicant believes the Examiner would have also indicated that claim 16 would be allowable if made independent. Therefore, applicant has also amended claim 16 to make it independent.

Finally, applicant has amended claim 12 to correct a syntactical error.

The rejection of claims 12 – 14, 17 – 18, 22 – 31, and 34 – 36 under 35 U.S.C. § 102(b) as being anticipated by Kleijn (5,517,595) is respectfully traversed.

The Examiner contends that claim 12 is taught by Kleijn at column 2, lines 36 – 65, but applicant finds no such teaching in the cited lines, which are reproduced below.

> The present invention provides a speech-coding method and apparatus. An illustrative embodiment of the speech coder comprises an outer layer and an inner layer. The outer layer is a prototype-waveform-interpolation

PAGE 15/31 * RCVD AT 9/19/2006 5:38:29 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-5/7 * DNIS:2738300 * CSID:2135334174 * DURATION (mm-ss):05-02

> analysis-synthesis system. Its analysis part computes the linear-prediction residual, performs pitch detection, and extracts the prototype waveforms. The synthesis part of the outer layer aligns the prototype waveforms, interpolates in time between the aligned prototype waveforms to create instantaneous waveforms, reconstructs the residual (excitation) signal by concatenation of samples taken from successive instantaneous waveforms, and filters the excitation signal with the linear-prediction synthesis filter. At high sampling rates (less than one half pitch cycle per prototype waveform), this outer layer analysis-synthesis system renders reconstructed speech which is virtually transparent.
>
> The inner layer of the illustrative speech coder quantizes the prototype waveforms. First, the prototype waveforms are processed with a smoothing window. This results in a smoothly evolving waveform (SEW) associated with each prototype waveform. The SEW is then subtracted from the original prototype waveform, to render a remainder, which will be called the rapidly evolving waveform (REW). The SEW and the REW are quantized independently. At low bit rates, the SEW can be replaced by waveform with a flat magnitude spectrum and a fixed phase spectrum. The SEW phase spectrum may be quantized with small set of possible states, and the SEW magnitude spectrum may be quantized differentially. At yet higher bit rates the SEW can be quantized differentially.

Nowhere in the cited text can one find any direction or even suggestion to use accumulated distortion between adjacent input waveforms and adjacent quantized and interpolated output waveforms. Yet, anticipation requires that each and every element as set forth in the claim is found, either expressly or inherently described, in the reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Clearly, the noted limitation of claim 12 is not found in the cited test and it is not apparent how it is inherent. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches the use of accumulated distortion between adjacent input waveforms and adjacent quantized and interpolated output waveforms.

The Examiner contends that claim 13 is taught by Kleijn, also at column 2, lines 36 – 65, but applicant finds no such teaching in the cited lines, *supra*. Nowhere in the cited text can one find any direction or even suggestion to extract a dispersion phase and incorporate analysis-by-synthesis of the dispersion phase. As before, anticipation requires that each and every element as set forth in the claim is found, either expressly or inherently described, in the reference. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to extract a dispersion phase and incorporate analysis-by-synthesis of the dispersion phase.

As for claim 14, the Examiner cites Kleijn at column 13, lines 45 – 65 and column 14, lines 15 - 35,contending that Kleijn teaches not only the method of claim 13, but also teaches providing at least one providing at least one codebook containing magnitude and dispersion phase information for predetermined waveforms, crudely aligning the linear phase of the input, then iteratively shifting the crudely aligned linear phase input, and/or comparing the shifted input, or equivalently shifting the quantized vector, to a plurality of vectors reconstructed from the magnitude and dispersion phase information contained in said at least one codebook, and selecting the reconstructed vector that best matches the input vector or one of the iteratively shifted input vectors. The cited lines are reproduced below.

> Inner Layer: SEW Quantization
> Since the average magnitude spectrum of the prototype waveform is normalized (the average is taken to mean the average over the above discussed subset of harmonics), the average magnitude of the REW and the average magnitude of the SEW are not independent. Generally, because of the normalization of the pitch-cycle waveform, the average squared magnitude (power) spectrum the SEW approximates unity minus the average power spectrum of the REW. If no information is transmitted concerning the SEW, then the SEW power spectrum is obtained by the receiver as unity minus the REW power spectrum, or, less accurately, the SEW magnitude spectrum is obtained as unity minus the REW magnitude spectrum. Taking the square root of the average of the power spectrum of the SEW gives an appropriate gain for a shape quantizer of the complex or magnitude spectrum of the SEW. Shape codebooks for

> either the SEW magnitude or complex spectrum can be trained using a representative data base of SEW magnitude or complex spectra which are normalized by this gain (i.e. the magnitude of each harmonic is divided by this gain).
>
> At lower bit rates, either no information is transmitted concerning the SEW, or only its magnitude spectrum is quantized. In this case, the magnitude spectrum and phase spectrum of the SEW are treated separately, and the SEW phase spectrum description can be switched between several sets of phase spectra. This switching can be done in a manner which requires no additional transmission of information. Instead, the switching can be based on the REW magnitude spectrum (i.e. frequency-dependent voicing-levels). During voiced speech, a phase spectrum derived from an original pitch-cycle waveform (preferably from a male with a large number of harmonics, i.e. a low fundamental frequency) can be used. Such a phase spectrum tends to result in distinct pitch pulses, resulting in proper alignment of the reconstructed prototype waveforms. During unvoiced signals, a random phase can be used, which does not result in large time-domain features, such as high pulses. However, it is advantageous to choose these spectra such that any time-domain features (large in the case of the voiced phase spectrum) are pre-aligned, so that no clear phase discontinuities appear during switches between these phases.

Nowhere in the cited text can one find any direction or even suggestion to compare shifted input, or shifting a quantized vector, to a plurality of vectors reconstructed from the magnitude and dispersion phase information contained in at least one codebook, and selecting the reconstructed vector that best matches one of the iteratively shifted input vectors. As before, anticipation requires that each and every element as set forth in the claim is found, either expressly or inherently described, in the reference. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to practice the foregoing limitations.

As for claim 17, the Examiner cites Kleijn at column 4, lines 1 – 7 and column 5, lines 14 – 23, contending that Kleijn teaches not only the method of claim 13, but also teaches providing a codebook containing magnitude and dispersion

phase information for predetermined waveforms, crudely aligning the linear phase of the input, then iteratively shifting the crudely aligned linear phase input, and/or comparing the shifted input, or equivalently shifting the quantized vector, to a plurality of vectors reconstructed from the magnitude and dispersion phase information contained in said at least one codebook, and selecting the reconstructed vector that best matches the input vector or one of the iteratively shifted input vectors. The cited lines are reproduced below.

> A characterizing waveform is a signal of a length which is at least one pitch-period, where the pitch-period is defined to be output of a pitch detection process. (Note that a pitch detection process always supplies a pitch-period even for speech signals without obvious periodicity; for unvoiced speech, such a pitch-period is essentially arbitrary.)
>
> Naturally, a characterizing waveform must describe at least one complete pitch cycle of voiced speech. Waveform interpolation coders generally include alignment processes for sequential characterizing waveforms. In the illustrative coding embodiment discussed below, this alignment is performed after the time-scale normalization of the pitch-cycle waveform to have unit pitch period. The time-scale normalization is uniform over the pitch cycle. During voiced speech, the alignment of the single pitch cycle essentially aligns the (single) pitch pulses of the characterizing waveforms.

Nowhere in the cited text can one find any direction or even suggestion to use spectral and temporal pitch searches, computing a number of adjacent pitch values, and then computing the most probable pitch value by computing the weighted average pitch value using the above weight. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to practice the foregoing limitations.

As for claim 18, the Examiner cites Kleijn at column 10, lines 52– 60, contending that Kleijn teaches not only the method of claim 17, but also teaches selecting boundaries of the segment that maximize the similarity, or minimize the

distortion measure, used for a pitch search, by iteratively shifting and expanding the segment and by shifting the segment. The cited lines are reproduced below.

> A prototype waveform quantizer is illustrated in the block diagram of FIG. 13. The first step of the quantization process is the determination and quantization of prototype gain in normalizer and extractor 501 and gain quantizer 506. Prototype waveforms may be coded more efficiently if they are first normalized. The relationship between normalized and unnormalized prototype waveforms is expressed in terms of a gain. Once a normalized prototype is determined, the gain is quantized. The quantized gain is communicated over the channel for use in synthesizing a prototype waveform at the receiver.

Nowhere in the cited text can one find any direction or even suggestion of selecting boundaries of the segment that maximize the similarity, or minimize the distortion measure, used for a pitch search, by iteratively shifting and expanding the segment and by shifting the segment. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to practice the foregoing limitations.

As for claim 22, the Examiner cites Kleijn at column 5, line 62 – column 6, line 50, contending that Kleijn teaches one to perform vector quantization of the waveform signal gain sequence using synthesis-by-analysis. The cited lines are reproduced below.

> The evolution of prototype waveform shape (as shown illustratively in the surface of FIG. 4) may be thought of as comprising low frequency and high frequency prototype waveform shape evolution. Illustratively, such low and high frequency prototype waveform shape evolution may be pictured as two surfaces, such as those presented in FIGS. 6 and 8, respectively. FIGS. 6 and 8 present illustrative low and high frequency waveform shape evolution surfaces, respectively, which sum to the surface of FIG. 4. The significance to the present invention of low and high frequency waveform shape evolution lies in the ear's ability to distinguish between slow and rapid evolution. Slowly evolving waveforms essentially describe the periodic component of the speech signal, and rapidly evolving waveforms essentially describe the noise

component of the speech signal. In accordance with information theory, the ear's ability to perceive information in the noise component of speech is low. As a result, such component may be quantized differently than the periodic component.

Each prototype waveform at discrete point in time (such as that presented in FIG. 3) has associated with it waveforms of the smoothly and rapidly evolving surfaces. Illustrative smoothly and rapidly evolving waveforms are shown at FIGS. 5 and 7, respectively. These waveforms represent a cross-section of the smoothly and rapidly evolving surfaces, respectively, at t=100.

In accordance with the present invention, slowly and rapidly evolving waveforms are determined for use in coding speech. Given the ear's differing sensitivity to such waveforms, an illustrative coding method in accordance with the present invention codes information about a smoothly evolving waveform more accurately than information about a corresponding rapidly evolving waveform.

An illustrative coder forms smoothly and rapidly evolving waveforms every 2.5 ms. The smoothly evolving waveform at a given point in time is formed by a smoothing process which uses as input a set of prototype waveforms falling within a time window centered at or about the point in time at which the smoothly evolving waveform is desired. This set of prototype waveforms corresponds to a portion of the surface presented in FIG. 4, the portion defined by the window. Prototype waveform parameters of like-index (such as Fourier-series coefficients) are grouped and averaged. This is done for each parameter index value. The result is a set of averaged parameters which correspond to a smoothly evolving waveform at the point in time of interest. This waveform is the smoothly evolving waveform (SEW), such as that shown in FIG. 5. The rapidly evolving waveform (REW) is determined by subtracting the SEW from the prototype waveform (through the subtraction of corresponding parameter values). The SEW and REW are then available for use in coding. In one embodiment of the present invention, only the REW need be quantized. In other embodiments, both the REW and SEW are quantized (with different techniques to reflect human hearing sensitivity to such waveforms).

Nowhere in the cited text can one find any direction or even suggestion of vector-quantization of a signal gain sequence. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to practice the foregoing limitation.

As for claim 23, the Examiner cites Kleijn at column 14, lines 42 - 46, contending that Kleijn teaches changing temporal weighting as a function of time whereby to emphasize local high energy events in the input signals. The cited lines are reproduced below.

> Thus, the SEW varies from "peaky" to "smeared out" as a function of the index. Alternatively, the peakiness can be measured in the original SEW (e.g. by measuring the relative signal energy in regions of high and low signal power within a pitch cycle). In this case, a peakiness index must be transmitted.

Nowhere in the cited text can one find any direction or even suggestion of changing temporal weighting to emphasize local high energy events. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to practice the foregoing limitation.

As for claim 24, the Examiner cites Kleijn at column 2, lines 36 – 62, and Figures 10, 11, 13, and 14, contending that Kleijn teaches adding self correlation to codebook vectors. The cited lines and Figures are reproduced below.

> The present invention provides a speech-coding method and apparatus. An illustrative embodiment of the speech coder comprises an outer layer and an inner layer. The outer layer is a prototype-waveform-interpolation analysis-synthesis system. Its analysis part computes the linear-prediction residual, performs pitch detection, and extracts the prototype waveforms. The synthesis part of the outer layer aligns the prototype waveforms, interpolates in time between the aligned prototype waveforms to create instantaneous waveforms, reconstructs the residual (excitation) signal by concatenation of samples taken from successive instantaneous waveforms, and filters the excitation signal with the linear-prediction synthesis filter. At high sampling rates (less than one half pitch cycle per prototype

waveform), this outer layer analysis-synthesis system renders reconstructed speech which is virtually transparent.

The inner layer of the illustrative speech coder quantizes the prototype waveforms. First, the prototype waveforms are processed with a smoothing window. This results in a smoothly evolving waveform (SEW) associated with each prototype waveform. The SEW is then subtracted from the original prototype waveform, to render a remainder, which will be called the rapidly evolving waveform (REW). The SEW and the REW are quantized independently. At low bit rates, the SEW can be replaced by waveform with a flat magnitude spectrum and a fixed phase spectrum.

FIG. 10

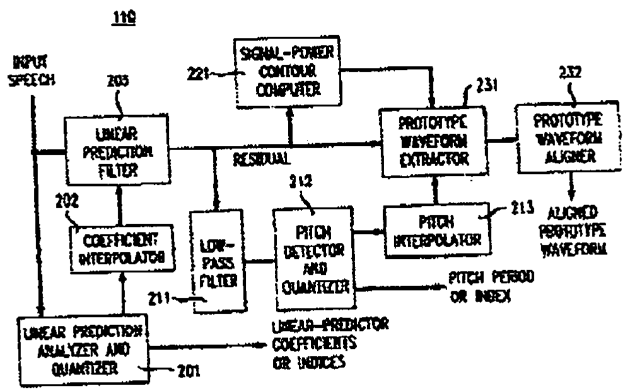


FIG. 11

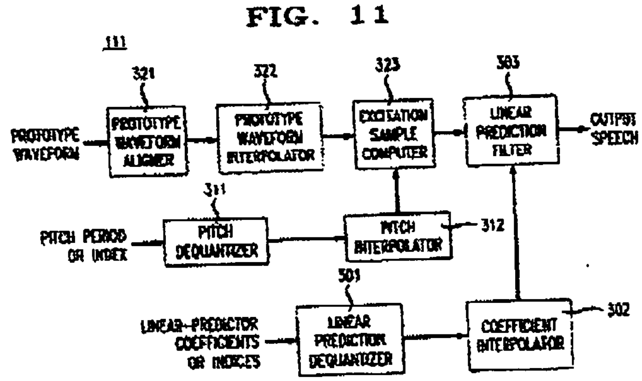


FIG. 13

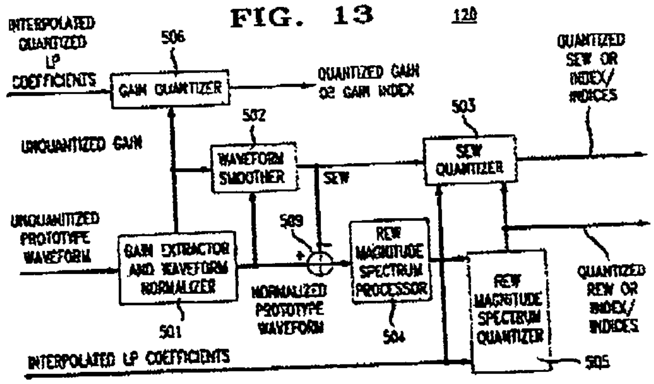
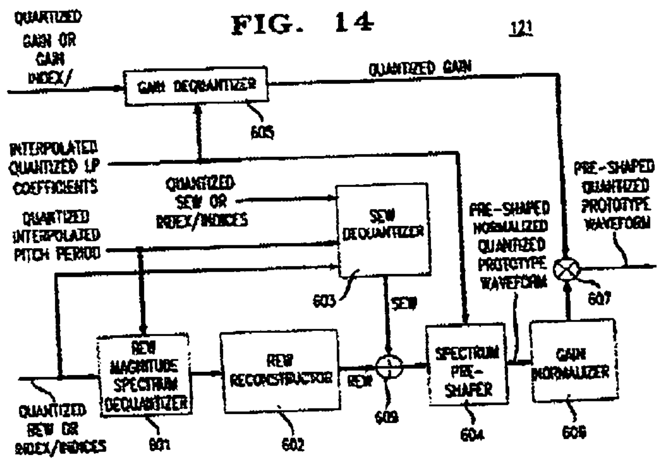


FIG. 14



Nowhere in the cited text or Figures can one find any mention of or suggestion of adding self correlation to codebook vectors. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to practice the foregoing limitation.

As for claim 25, the Examiner cites Kleijn at column 14, lines 50 - 61, contending that Kleijn teaches not only the method of claim 24, but also teaches selecting between the high and low correlation filters or predictor is made to

maximize the similarity between the signal vector and a reconstructed vector. The cited lines are reproduced below.

> If the pitch detector renders, for example, a pitch period which is doubled the correct value during a segment voiced speech, then the extracted (original) prototype waveform will contain two pitch cycles. This means that there will be two pitch pulses in the prototype waveform. Thus, the basic analysis-synthesis system of the outer layer 101 will still provide excellent reconstructed speech quality. However, if the phase information is discarded in the quantization of the SEW, then only a single pitch pulse will be present in the reconstructed waveform, and the reconstructed speech will sound significantly different from the original. Such distortions often sound natural, however, because they simulate naturally occurring conditions.

Nowhere in the cited text can one find any direction or even suggestion of selecting between the high and low correlation filters or predictor. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to practice the foregoing limitation.

As for claim 26, the Examiner cites Figure 14, item 501 of Kleijn, contending that Kleijn teaches not only the method of claim 24, but also teaches using each value of gain index in the synthesis-by-analysis vector-quantization of the signal gain. The cited Figure is reproduced *supra* with respect to the rejection of claim 24. Unfortunately, item 501 doesn't appear in Figure 14, but perhaps the Examiner is referring to item 501 in Figure 13 (also reproduced *supra* with respect to the rejection of claim 24) or item 601 in Figure 14. In either case, nowhere can one find any direction or suggestion of using each value of gain index in the synthesis-by-analysis vector-quantization of the signal gain. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to practice the foregoing limitation.

As for claim 27, the Examiner cites Kleijn at column 17, lines 31 - 56, contending that Kleijn teaches not only the method of claim 22, but also teaches using each value of gain index to select from a plurality of shapes and associated

predictors or filters, each of which is used to generate an output shape vector, and comparing the output shape vector to an input shape vector. The cited lines are reproduced below.

> In spectrum pre-shaper 604, the normalized, quantized prototype waveform is provided with spectral pre-shaping to enhance the final speech quality. The purpose of this spectral pre-shaping is identical to that of the postfilter as used for example in CELP algorithms. Thus, the pre-shaper is equivalent to filtering the prototype waveform with an all-pole and an all-zero filter in cascade. The all-pole filter has its poles at the same frequencies as the poles of the all-pole linear-prediction (LP) filter, but its poles have radius smaller by a factor γ_p. The zeros of the all-zero filter have the same frequency as the poles of the all-pole filter, but the zeros have a radius smaller by a factor γ_z / γ_p. To add this formant structure, the waveform may be processed in accordance with expressions (18) and (19) in: W. B. Kleijn, "Encoding Speech Using Prototype Waveforms" IEEE Trans. Speech and Audio Processing, Vol. 1, p. 386-399, 1993. A good formant structure for the pre-shaped prototype waveform is obtained by using γ_p =0.9, and γ_z = 0.8. This pre-shaping enhances the spectral peaks of the reconstructed speech signal. Alternatively, the pre-shaping can be performed by computing the magnitude spectrum of the transfer function of the cascade of the all-zero and all-pole pre-shaping filters, and then multiplying the complex spectrum of the normalized, quantized prototype waveform by this magnitude spectrum. Note that in contrast to conventional postfiltering, the pre-shaping does not affect coder delay.

Nowhere in the cited text can one find any direction or suggestion of comparing the output shape vector to an input shape vector. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to practice the foregoing limitation.

As for claims 28 and 29, the Examiner cites Kleijn at column 13, lines 31 - 33, contending that Kleijn teaches not only the method of claim 27, but also teaches that the plurality of shapes has a predetermined number in the range of 2 to 50. However, fundamentally, the limitations of the parent claim 27 are not shown or

suggested, i.e., comparing the output shape vector to an input shape vector. The cited lines are reproduced below.

As for claim 30, the Examiner cites Kleijn at column 14, line 8 – 61 and (presumably) column 16, lines 16 - 27, contending that Kleijn teaches a plurality of bits allocated to the vector-quantization of the dispersion phase of the slowly evolving waveform phase from which the linear shift attribute was reduced or removed. The cited lines are reproduced below.

> The SEW quantizer 503 can operate at various levels of accuracy. It is SEW quantization which mostly determines the bit rate of the speech coding system discussed here. As was mentioned above, for the lowest bit-rate coders, no transmission of SEW information is needed. As a result, speech is coded using only REW information and quantizer 503 does not operate.
>
> At lower bit rates, either no information is transmitted concerning the SEW, or only its magnitude spectrum is quantized. In this case, the magnitude spectrum and phase spectrum of the SEW are treated separately, and the SEW phase spectrum description can be switched between several sets of phase spectra. This switching can be done in a manner which requires no additional transmission of information. Instead, the switching can be based on the REW magnitude spectrum (i.e. frequency-dependent voicing-levels). During voiced speech, a phase spectrum derived from an original pitch-cycle waveform (preferably from a male with a large number of harmonics, i.e. a low fundamental frequency) can be used. Such a phase spectrum tends to result in distinct pitch pulses, resulting in proper alignment of the reconstructed prototype waveforms. During unvoiced signals, a random phase can be used, which does not result in large time-domain features, such as high pulses. However, it is advantageous to choose these spectra such that any time-domain features (large in the case of the voiced phase spectrum) are pre-aligned, so that no clear phase discontinuities appear during switches between these phases.
>
> It is possible to use a sequence of phase spectra for the SEW, characterized with an index ranging from O through K. Whenever the REW information indicates that the

> signal is periodic, the index is increased, and whenever the REW information indicates that the signal is nonperiodic, the index is decreased. Thus, the SEW varies from "peaky" to "smeared out" as a function of the index. Alternatively, the peakiness can be measured in the original SEW (e.g. by measuring the relative signal energy in regions of high and low signal power within a pitch cycle). In this case, a peakiness index must be transmitted.
>
> It should be noted that a fixed or switched phase spectrum require a highly accurate pitch detector. If the pitch detector renders, for example, a pitch period which is doubled the correct value during a segment voiced speech, then the extracted (original) prototype waveform will contain two pitch cycles. This means that there will be two pitch pulses in the prototype waveform. Thus, the basic analysis-synthesis system of the outer layer 101 will still provide excellent reconstructed speech quality. However, if the phase information is discarded in the quantization of the SEW, then only a single pitch pulse will be present in the reconstructed waveform, and the reconstructed speech will sound significantly different from the original. Such distortions often sound natural, however, because they simulate naturally occurring conditions.
>
> The decomposition of each prototype waveform into an SEW and REW allows the embedding of lower bit rate coders within a higher rate coder. Embedded coders are useful if the capacity of the communication system is sometimes exceeded and for conferencing systems. In an example of an embedded coder at 8 kb/s, the bit stream can be separated into a bit stream which represents a 4 kb/s coder and a second 4 kb/s bit stream which provides an enhancement of the reconstructed speech quality. When external situations demand this, the latter bit stream is removed, rendering a 4 kb/s coder at to the receiver.

Nowhere in the cited text can one find any direction or suggestion of reducing or removing the linear shift attribute from the slowly evolving waveform phase. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to practice the foregoing limitation.

As for claim 31, the Examiner cites Kleijn at column 16, lines 16 - 27, contending that Kleijn teaches allocating at least one bit to the dispersion phase. The cited lines are reproduced in connection with the rejection of claim 30, in the last paragraph reproduced *supra*. Nowhere in the cited text can one find any direction or suggestion of allocating any bits to the dispersion phase. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to practice the foregoing limitation.

As for claim 34, the Examiner just contends that the claim is similar in scope and content of the method claims above and are rejected under the same rationale. Presumably, the Examiner is referring to the rejection of claim 17, which was traversed in above comments. In addition, the Examiner is respectfully reminded that the rejection is one under section 102(b) and therefore it is inappropriate to simply rely on such a generalized statement. Nowhere in the Kleijn can applicant find any mention of autocorrelation, or even correlation. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to practice the foregoing limitation.

As for claim 35 and 36, the Examiner cites Kleijn at column 5, line 62 – column 6, line 50, and column 14, lines50 - 61, contending that Kleijn teaches using accumulated spectrally weighted distortion (claim 35) and that he teaches the method of claim 22 using a switch filter or predictor. The cited lines are reproduced in connection with the rejections respectfully of claims 22 and 25.30, *supra*. Nowhere in the cited text can one find any direction or suggestion of using accumulated spectrally weighted distortion. Nowhere in the cited text can one find any direction or suggestion of using a switch filter or predictor in performing vector quantization of a waveform signal gain sequence. The Examiner is respectfully requested to elaborate on why he believes the cited text, or any other aspect of Kleijn inherently teaches one to practice the foregoing limitation.

In applicant's last response, he asserted that Kleijn does not teach or suggest any of the claimed embodiments, that the instant AbS is between a sequence of input waveforms to sequence of quantized and interpolated waveforms, rather than between only one input to one output waveform (per frame) as in Kleijn. The AbS of the claims takes into considerations the effect of interpolating the waveforms, unlike Kleijn. The AbS of the claims is different from Kleijn's AbS.

In addition, the waveform is shifted in order to eliminate the linear phase shift between the quantizer input to its output, which helps to eliminate the linear shift and to focus on the dispersion phase. In Kleijn, the shift is done in a different context for a completely different purpose, which is smoothing the characteristic waveform, and no phase quantization method or system is described in Kleijn, and no focus on the dispersion phase is suggested there.

Further novelty is found in the varying boundaries of the summations, in computing the distortion measure or an equivalent similarity measure, such as normalized correlation, used for the pitch search. These varying boundaries are those used for the summations used in the computation of the similarity (or distortion) measure, while the boundaries mentioned in Kleijn are the extracted waveform's boundaries, a totally different subject and context.

Moreover, Kleijn suggests quantizing the SEW on a gain-shape product VQ, i.e. gain-shape-VQ applied to one SEW vector. Here we apply VQ to the gain sequence. These are two different subjects and context. Also, Kleijn doesn't perform Vector-Quantization of the gain (instead he uses down sampling and scalar quantizer), whereas relevant claims refer to Vector-Quantization of the gain using AbS and switch prediction. Kleijn doesn't use any temporal weighting nor does he use analysis-by-synthesis or switch prediction for the gain quantization.

Present relevant claims are novel in using accumulated distortion for the quantization, not distortion between one input to one output vector.

Indexes 0-to-K in Kleijn refer to the level of voicing, periodicity, or the peakiness of the SEW waveform, and not to a full quantization of the phase which may produce changing phase even when the level of voicing is unchanged. Kleijn mentions the possibility of phase spectra quantization and doesn't provide any

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method or system to do it. The method of this invention focuses specifically on the dispersion phase attribute of the phase, and provides a method and a system to extract and to quantize the dispersion phase.

In view of the foregoing, Applicants believe the application is in condition for allowance and respectfully solicit a Notice of Allowance.

The Commissioner is hereby authorized to charge payment of any fees required associated with this communication or credit any overpayment to Deposit Account No. 50-3881. If an extension of time is required, please consider this a petition therefor and charge any additional fees which may be required to Deposit Account No. 50-3881. A duplicate copy of this paper is enclosed.

Dated: September 19, 2006

Respectfully submitted

By

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